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7 **MODIFYING CONTENT RATING**
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10 **CROSS REFERENCE TO RELATED DOCUMENTS**

11 This application is related to U.S. Serial Number 10/319,066 filed December
12 13, 2002 entitled "Content Replacement by PID Mapping" to Candelore, et al. which
13 is hereby incorporated herein by reference.
14

15 **BACKGROUND**

16 Parental (or other supervisory) control over content viewed by children, for
17 example, can be exercised in several ways. Using "V-Chip" enabled devices,
18 programming having a content rating outside of user specified limits can be
19 blocked. Other solutions have been devised to block only objectionable portions
20 of content provided on DVD (Digital Versatile Disc). Each of these approaches
21 blocks or skips content which may limit programming options or cause a loss of
22 continuity of program material.
23

24 **BRIEF DESCRIPTION OF THE DRAWINGS**

25 Certain exemplary embodiments may be best understood by reference to the
26 following detailed description taken in conjunction with the accompanying drawings
27 in which:

28 **FIGURE 1** illustrates replacement of content in a data stream in a manner
29 consistent with certain embodiments of the present invention.

FIGURE 2 is a flow chart describing a content replacement process consistent with certain embodiments of the present invention.

FIGURE 3 is another flow chart describing a content replacement process consistent with certain embodiments of the present invention.

FIGURE 4 is a block diagram of an illustrative television Set-Top Box consistent with certain embodiments of the present invention.

FIGURE 5 is a block diagram of another illustrative television Set-Top Box consistent with certain embodiments of the present invention.

FIGURE 6 is a block diagram of a content decoder consistent with certain embodiments of the present invention.

FIGURE 7 is a flow chart of a process for replacement content and filter data generation consistent with certain embodiments of the present invention.

DETAILED DESCRIPTION

There is shown in the drawings and will herein be described in detail specific embodiments, with the understanding that the present disclosure is to be considered as exemplary and is not intended to limit the invention to the specific embodiments shown and described. In the description below, like reference numerals are used to describe the same, similar or corresponding parts in the several views of the drawings.

For purposes of the present description, the term “Set-Top Box” refers to a television Set-Top Box (STB) device such as those used to tune, receive, decrypt, and/or decode transmissions from cable or satellite television distribution systems, as well as other types of STB devices including, but not limited to disc drive based personal video recorders (PVR) and other similar devices that can receive and decode digital audio/video (A/V) content such as MPEG (Moving Pictures Expert Group) encoded signals used to encode digital television or movies. Moreover, it is widely contemplated that the functionality of such devices will be incorporated within television receivers, thus, certain embodiments consistent with the present

1 invention should not be construed limited to those realized within an STB type
2 device.

3 The above-referenced patent application contains certain embodiments
4 which utilize multiple Packet Identifiers (PID) in a stream of digital content (e.g.,
5 MPEG compliant digital content) to provide for substitution of one segment of
6 content for another. Some of the technology described in these applications are
7 applicable to certain embodiments consistent with the present invention.

8 Certain types of content, such as movies, have an associated content rating
9 established by a supervisory body to inform potential viewers of the type of material
10 that may form a part of the content. Ratings of G, PG, PG-13, R and NC-17 are
11 commonly established for most movies produced in the United States by the
12 Classification and Ratings Administration (CARA) of the Motion Picture Association
13 (MPA) or the Motion Picture Association of America (MPAA). Television
14 programming is similarly rated by the TV Parental Guidelines Monitoring Board,
15 which provides ratings of TV-Y, TV-Y7, TV-Y7-FV, TV-G, TV-14 and TV-MA.

16 For purposes of this document, content having a rating provided under such
17 rating systems will be referred to as having a "higher" rating if it is intended for more
18 mature audience, and a "lower" rating if it is intended for a more general or less
19 mature audience (i.e., the above ratings are listed from lowest to highest).
20 Therefore, within this terminology, an R rating would be considered a "higher" rating
21 than a G rating. Such nomenclature is defined herein for simplicity of description
22 of the above rating system as well as equivalent systems, without intent for the
23 nomenclature to pass any judgement on the quality of such content. Additionally,
24 the term "content rating" or simply "rating" is intended to embrace any suitable
25 content rating system, domestic or foreign, public, private or governmental which
26 serves a similar function. Such rating information is generally provided as data
27 embedded within the movie's vertical blanking interval or using other program
28 specific information or tabulated in an EPG (Electronic Programming Guide) when
29 the movie is stored or transmitted.

1 Many parents, and others in a supervisory capacity, would like to have the
2 ability to prevent unauthorized viewing of programming (e.g., movies) which contain
3 certain types of content. For example, certain movies may contain nudity, violence,
4 harsh language or explicit sexual content are generally deemed to have a relatively
5 high rating, for example, of R whereas programming directed to smaller children
6 might have a relatively lower rating of G. However, in many cases, the parent may
7 not mind if the vast majority of a particular movie were viewed by their children,
8 even though it might have a rating that exceeds that which they would normally find
9 acceptable, so long as the objectionable portions are not viewed. Often, only a few
10 scenes contain objectionable material. If such material were altered or omitted from
11 the movie, the parent might have no objection to the viewing of the content. Others,
12 for religious or personal reasons, may not wish to be exposed to such material
13 themselves. (Thus, the example used herein of a parent that wishes to control
14 viewing by a child is merely illustrative and in no way limiting.)

15 Turning now to **FIGURE 1**, a mechanism for substitution of portions of
16 content based upon a rating system can be understood by viewing a stream 110 of
17 digital video (e.g., MPEG encoded) content. In this simple example, the video
18 stream contains program content which has been assigned a packet identifier (PID)
19 of value 100 in order to identify packets in a transport stream which are associated
20 with this particular video stream. In this simple example, the stream of content is
21 divided into three segments 114, 116 and 118. Consider the example wherein
22 content stream 110 carries a rating of "R" which would suggest that there is at least
23 one segment of content, in this case assume segment 116, which contains material
24 deemed unsuitable for viewing by less mature audiences. In this case, one or more
25 segments of substitute content 122 and 126 can be used as substitutes for the
26 objectionable segment 116. For instance, segment 122 can be provided in which
27 the R rated content is replaced with content which is rated "PG-13". This segment
28 of replacement content 122 can be identified by using a different PID such as 101.
29 Similarly, segment 126 can be provided in which the "R" rated content is replaced

1 with content which is rated "G". This segment of replacement content 126 can be
2 identified by using a different PID such as 102.

3 While segments of content, per se, are not conventionally rated, there are
4 criteria established for what types of content would generally be suitable for each
5 particular content rating grade. Of course, such ratings are somewhat subjective,
6 but by conservative application of such criteria, it is possible to provided
7 replacement content segments which would, if they were part of the original content,
8 have rendered the original content suitable for receipt of a lower rating. Thus,
9 consistent with certain embodiments, the replacement content can be created to
10 effectively a lower rating of the overall main content when the replacement is
11 implemented by editing, manipulating or re-enacting the objectionable segments.
12 In other embodiments, the effective rating can be reduced by substituting packets
13 in which the video is blanked, censored or re framed to produce a lower rating.
14 Audio packets can be generated which are over-dubbed with audio, censored by
15 masking with a beep or tone or other sound to eliminated the objectionable material
16 or simply blanked by omitting the objectionable audio. Any combination of the
17 above techniques can also be used.

18 In order to make the substitution of content, the segment 116 is removed
19 from the video stream and one of the replacement segments 122 or 126 can be
20 inserted in it's place. This can be accomplished in the case of MPEG encoded
21 video data by using an MPEG splice function, for example.

22 Generally speaking, the replacement data can downloaded from the Internet
23 or obtained as packaged media or received by any other suitable mechanism in
24 which an MPEG adaptation field can be used to store time stamp information used
25 as a filter to determine locations in the original program content (stream 110) in
26 which the replacement content 122 or 126 should be substituted in the original
27 content.

28 Thus, a method of modifying content in a manner consistent with certain
29 embodiments involves determining that the content has a content rating which is

1 greater than a specified content rating limit; identifying at least one segment of the
2 content to be replaced; obtaining at least one segment of replacement content to
3 substitute for the segment content to be replaced, wherein the replacement content
4 meets criteria for a content rating which is no greater than the specified content
5 rating limit; and replacing the at least one segment of content to be replaced with
6 the at least one segment of replacement content.

7 **FIGURE 2** shows a more detailed process 200 for modifying content as
8 described above starting at 204. At 208 a rating limit (which is defined by the user
9 to establish the maximum permissible content rating for viewing) is retrieved from
10 memory or a storage device such as a disc drive. This rating limit may be input by
11 the user depending upon the viewing audience or may be determined by entries
12 made to set up an entitlement package associated with receipt of the program
13 content. At 212, the content rating is determined, for example, by reference to
14 electronic program guide material or by reading embedded content rating data or
15 using any other suitable technique for ascertaining a particular content rating. The
16 content rating and rating limit are then compared at 216 to determine whether or not
17 the content is suitable for viewing, as determined by use of the rating limit as a
18 standard. If the content rating is less than or equal to the rating limit, the content
19 is simply played in a normal fashion at 220 until the content ends at 224.

20 If, however, the rating limit is exceeded by the content rating at 216, the
21 process determines at 230 if a suitable content filter is available (e.g., in the form
22 of a segment of content identified as replacement content for the content of interest
23 in which suitable start and stop time stamps are available). If not, the content is
24 blocked at 234 and the process ends at 224. In this manner, objectionable content
25 for which a suitable filter is not available is blocked so that younger viewers (for
26 example) are not inadvertently exposed to the content.

27 If a filter is available at 230 for this particular content, the filter and
28 replacement content is retrieved (e.g., from a disc drive, an optical disc or
29 downloaded from an Internet site) at 238. The content is then replaced at the times

1 or other defined locations (e.g., packet numbers) as defined by the filter parameters
2 at 242. Since the replacement content may have a different PID than the original
3 content, and since some decoders may only be able to decode data streams having
4 a single PID (or set of PIDs) the replacement process of 242 may incorporate a
5 remapping of the PID of the replacement content so that the replacement content
6 has the same PID as the original content. The content, having replaced segments
7 can then be played at 246 in a normal manner until the process ends at 224.

8 Thus, as described above, a method of modifying content consistent with
9 certain embodiments involves determining that the content has a content rating
10 which is greater than a specified content rating limit; determining if a filter is
11 available for the content; and if a filter is not available for the content, blocking the
12 content. If a filter is available for the content, the process involves identifying at
13 least one segment of the content to be replaced; obtaining at least one segment of
14 replacement content to substitute for the segment content to be replaced, wherein
15 the replacement content meets criteria for a content rating which is no greater than
16 the specified content rating limit; and replacing the at least one segment of content
17 to be replaced with the at least one segment of replacement content.

18 Another method of modifying content consistent with certain embodiments
19 involves determining that the content has a content rating which is greater than a
20 specified content rating limit; identifying at least one segment of the content to be
21 replaced by retrieving a filter for the content, wherein the filter specifies a location
22 for each of the at least one segment of content; obtaining a segment of replacement
23 content corresponding to each segment of content to be replaced, wherein the
24 replacement content meets criteria for a content rating no greater than the specified
25 content rating; and replacing each segment of content to be replaced with the
26 corresponding segment of replacement content.

27 A more detailed view of a routine for carrying out content substitution in a
28 manner consistent with certain embodiments of the present invention is depicted
29 as process 300 of **FIGURE 3** starting at 302. At 306, the PID value of the main

1 content and the replacement content are read or otherwise determined. At 310, the
2 start and stop points (or other time or location identifier data) is read from the filter
3 parameters for the first (or next) segment of replacement content. At 314, the
4 process determines whether or not the start point has been reached (or in the case
5 of the first replacement segment, whether or not the replacement content is at the
6 start of the main content). If not, the main content is played at 318.

7 If the end of the main content is reached at 322, control passes to 370. If the
8 end of the content has not been reached at 322, control returns to 314 to determine
9 if the start point for the next segment of replacement content has been reached.
10 When this start point for the next segment of replacement content is reached at 314
11 the replacement content is checked at 328 to determine that it is available and
12 usable (i.e., not corrupted in some manner). If the content is not usable or available
13 for whatever reason (including presence of only filter data and not replacement
14 content), the process jumps to the stop point so that the objectionable material is
15 effectively removed for playback at 334.

16 If, however, the replacement content is available at 328, the replacement
17 content is retrieved at 338 and is used to replace the removed main content at 342.
18 The PID of the replacement content is mapped to the PID of the main content at 346
19 and the content is sent to a decoder at 350 for play of the replacement content.
20 Control then returns to 338 until the stop point is reached at 356. Assuming the end
21 of the content has not been reached at 360 (in which case the process ends at
22 370), the process returns to 310 to begin the process for replacement of the next
23 segment of content.

24 Therefore, in the manner described, a method of modifying content
25 consistent with certain embodiments involves identifying the content by a first
26 Packet Identifier (PID); obtaining a content rating for the content; obtaining a
27 specified content rating limit; determining that the content has a content rating
28 which is greater than the specified content rating limit; identifying a plurality of
29 segments of the content to be replaced by retrieving a filter for the content, wherein

1 the filter specifies a location for each of the segments of content; obtaining a
2 plurality of segments of replacement content corresponding to the plurality of
3 segments of content to be replaced, wherein the segments of replacement content
4 each meet criteria for having a content rating no greater than the specified content
5 rating, and wherein the replacement content is identified by a second PID; and
6 replacing each of the plurality of segments of content to be replaced with the
7 corresponding segments of replacement content.

8 The method of modifying content can be carried out in a television Set-Top
9 Box, in certain exemplary embodiments, by (for example) identifying the content by
10 a first Packet Identifier (PID); obtaining a content rating for the content; obtaining
11 a specified content rating limit from a stored value; determining that the content has
12 a content rating which is greater than a specified content rating limit; determining
13 if a filter is available for the content; if a filter is not available for the content,
14 blocking the content. If a filter is available for the content, the process can proceed
15 by downloading the filter; using the filter to identify at least one segment of the
16 content to be replaced; downloading at least one segment of replacement content
17 to substitute for the segment content to be replaced, wherein the replacement
18 content meets criteria for a content rating which is no greater than the specified
19 content rating limit, and wherein the replacement content is identified by a second
20 PID; wherein the at least one segment of replacement content contains time
21 stamps that define start times and stop times for substitution of each of the at least
22 one segment of replacement content for the at least one segment of content to be
23 replaced and wherein the time stamps are carried in an MPEG adaptation field;
24 replacing the at least one segment of content to be replaced with the at least one
25 segment of replacement content, wherein the replacing is carried out using an
26 MPEG splice function; and mapping the at least one segment of replacement
27 content from the second PID to the first PID.

28 The filter information, as disclosed above, can be supplied in many suitable
29 formats including, but not limited to, the method described above wherein the filter

1 information is embedded within a transport stream carrying the replacement
2 content. In other embodiments, however, a separate table or listing of start and
3 stop points, packet numbers or other equivalent data can be supplied without
4 departing from certain embodiments.

5 **FIGURE 4** shows one embodiment of a television STB 400 that can be used
6 to implement processes consistent with certain embodiments. Those skilled in the
7 art will appreciate upon consideration of the present teaching that such STB 400
8 may be configured in many variations and may incorporate one or more processors
9 operating under program control to implement one or more of the functions
10 described herein. In this illustrative embodiment, a cable system head end 404
11 serves as a Multiple Service Operator (MSO) providing television programming to
12 the STB 400 via a cable system network 408. Head end 404 may also serve as a
13 source of access to the Internet 412 and may thus provide the services equivalent
14 to those of an Internet Service Provider (ISP) to STB 400 in certain embodiments.
15 Television programming are received by STB 400 through tuner and receiver
16 circuitry 416 used to tune to individual television channels. Additionally, an internal
17 (or external) modem 420, such as a DOCSIS compliant modem, may be connected
18 to the cable system to adapt the cable system to data communication.

19 The receiver circuit 416 strips rating information from the transport stream
20 associated with a particular channel (or otherwise obtains the rating, e.g., from
21 EPG data) and provides that information to comparison circuit 424. Comparison
22 circuit 424 is used to carry out a comparison of the rating with the rating limit
23 information stored at 428 as a result of user input or stored as a result setup of an
24 entitlement package for the cable system. The result of the comparison is provided
25 to a filter 432 that takes the main content from the tuner / receiver 416 and filters
26 the content if the rating of the content exceeds the rating limit.

27 The filtering is carried out on the basis of filter parameters received, for
28 example, via modem 420, and stored on a storage device such as a disc drive 436.
29 Such filter parameters are provided to the filter 432 so that packets of data

1 corresponding to segments of objectionable content are removed from the main
2 content data stream. Replacement content, for example stored on storage device
3 436, is provided to a PID mapper 440 that maps the replacement content's PID to
4 the same PID as that of the main content. This replacement content is then
5 supplied to a content replacer 444 that places the replacement content in the data
6 stream -- preferably at the location where the objectionable content was removed.
7 The modified content is then supplied to a decoder 450 for decoding into A/V data
8 that can be presented to the user (e.g., NTSC or PAL video).

9 In this manner, a content decoding device consistent with certain
10 embodiments has a comparing circuit that compares a content rating of the content
11 with a specified content rating limit. A filter identifies a location in the content of at
12 least one segment of the content to be replaced. A content replacer replaces the
13 at least one segment of content to be replaced with at least one segment of
14 replacement content, wherein the replacement content meets criteria for a content
15 rating which is no greater than the specified content rating limit.

16 While the above example depicts use of certain embodiments in connection
17 with a cable television network signal, this should not be considered limiting since
18 the process can be adapted to a variety of different realizations. In **FIGURE 5**, a
19 satellite television system embodiment of a television STB is depicted as 500. In
20 this illustrative embodiment, the STB 500 operates in a manner similar to that of
21 STB 400 except that modem 520 is depicted as being connected to the Internet 412
22 via a separate connection (e.g., DSL, T1, cable or dial-up). This, however is not to
23 be limiting since this variation is only one of many variations, and in other
24 embodiments the Internet connection could be obtained via the satellite link.

25 In **FIGURE 5**, tuner / receiver 516 is connected to a satellite antenna 550
26 incorporating a low-noise block (LNB) circuit and further incorporates other
27 conventional satellite receiver circuitry. Antenna 550 receives programming content
28 and other associated data from a satellite 556 which receives the programming
29 content and other associated data from one or more land based transmitting

1 antennas 560 connected to one or more satellite service providers 566. Otherwise,
2 operation of this embodiment can be similar to that of STB 400.

3 In **FIGURE 6**, a content decoder 600 implements a similar process for
4 content supplied by an internal or external content player device 670 (e.g., a DVD
5 player, PVR or similar devices). The output of the content player device 670 is
6 coupled to an interface 616 that supplies rating information to compare circuit 424
7 and the main content data stream to filter 432. In this illustrative embodiment, the
8 STB 600 operates in a manner similar to that of STB 400 except that modem 520
9 is again depicted as being connected to the Internet 412 as shown (e.g., DSL, cable
10 or dial-up). This embodiment may also be arranged to require a rating limit as an
11 input from user interface 628, which may be password protected to facilitate
12 parental control. Moreover, storage medium 436 could be the same storage
13 medium as that used to store the main content (e.g., in the case of a PVR).
14 Otherwise, operation of this embodiment can be similar to that of STB 400, except
15 that the main content source can be packaged media such as DVD or other such
16 media.

17 **FIGURE 7** depicts an exemplary process 700 for generation of the filter data
18 and replacement content starting at 704. At 708, replacement content is generated
19 in which the replacement content meets criteria for a lower rating than the main
20 content. At 712, filter data are generated wherein such filter data define the starting
21 and stopping points for the content replacement. At 716, the replacement content
22 can be stored in a computer readable storage medium and/or can be transmitted
23 to a decoder device such as 400, 500 or 600 from a remote location for use in the
24 processes described above or equivalent. The process ends at 720.

25 Thus, a method of producing replacement content for replacement of
26 segments of main content consistent with certain embodiments involves generating
27 segments of replacement content corresponding to segments of main content,
28 wherein the segments of replacement content meet criteria for a lower content
29 rating than that of the main content; generating filter data that identifies starting

1 points and stopping points in the main content for substitution of the replacement
2 data for the main content; and storing the filter data and the replacement content
3 as one or more computer readable data.

4 In another embodiment, a method of producing replacement content for
5 replacement of segments of main content, involves generating segments of
6 replacement content corresponding to segments of main content, wherein the
7 segments of replacement content meet criteria for a lower content rating than that
8 of the main content; generating filter data that identifies starting points and stopping
9 points in the main content for substitution of the replacement data for the main
10 content; and transmitting the filter data and the replacement content to a remotely
11 located decoding device.

12 In certain embodiments, the main content is identified by a first Packet
13 Identifier (PID) and the replacement content can be identified by a second PID.
14 The filter data can include time stamps that define start times and stop times for
15 replacement of the segment of replacement content for the segment of content to
16 be replaced. Such time stamps can be carried in an MPEG adaptation field.

17 Those skilled in the art will recognize that certain embodiments have been
18 described based upon use of a programmed processor. However, other
19 embodiments could be implemented using hardware component equivalents such
20 as special purpose hardware and/or dedicated processors which are equivalents
21 to the invention as described and claimed. Similarly, general purpose computers,
22 microprocessor based computers, micro-controllers, optical computers, analog
23 computers, dedicated processors and/or dedicated hard wired logic may be used
24 to construct alternative equivalent embodiments.

25 Those skilled in the art will appreciate that the program steps and associated
26 data used to implement the embodiments described above can be implemented
27 using disc storage for 436 as well as other forms of computer readable storage
28 devices such as for example Read Only Memory (ROM) devices, Random Access
29 Memory (RAM) devices; optical storage elements, magnetic storage elements,

1 magneto-optical storage elements, flash memory, core memory and/or other
2 equivalent storage technologies. Such alternative storage devices should be
3 considered equivalents. Moreover, the storage medium used could be a separately
4 purchased package medium which does not utilize an Internet download to provide
5 the filter parameters and replacement content.

6 Certain embodiments described herein are implemented using a
7 programmed processor executing programming instructions that are broadly
8 described above in flow chart form that can be stored on any suitable computer
9 readable storage medium or transmitted over any suitable electronic communication
10 medium. However, those skilled in the art will appreciate that the processes
11 described above can be implemented in any number of variations and in many
12 suitable programming languages without departing from the present invention. For
13 example, the order of certain operations carried out can often be varied, additional
14 operations can be added or operations can be deleted without departing from the
15 invention. Error trapping can be added and/or enhanced and variations can be
16 made in user interface and information presentation without departing from the
17 present invention. Such variations are contemplated and considered equivalent.

18 While specific embodiments have been described, it is evident that many
19 alternatives, modifications, permutations and variations will become apparent to
20 those skilled in the art in light of the foregoing description.

21 What is claimed is: